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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/087,566	03/01/2002	Masahiro Furo	134.142	3943

7590 08/30/2006

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EXAMINER

SAVAGE, JASON L

ART UNIT PAPER NUMBER

1775

DATE MAILED: 08/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/087,566

Applicant(s)

FURO ET AL.

Examiner

Jason L. Savage

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 73-124 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 76-79, 83-88, 93-98, 102-105, 109-114 and 119-124 is/are allowed.
- 6) ☒ Claim(s) 73-75, 80-82, 89-92, 99-101, 106-108 and 115-118 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 20060809.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_.

***Continues Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office Action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6-12-06 has been entered.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 73-75, 80-82, 89-92, 99-101, 106-108 and 115-118 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ning et al. (US 5,965,193) in view of Boutin et al. (US 4,222,774).

Ning discloses an electronic circuit substrate made of aluminum ceramic composite material wherein an electronic circuit is formed on an aluminum surface of the aluminum ceramic composite material. The aluminum-ceramic composite material is made by directly solidifying an aluminum alloy on at least a portion of a ceramic substrate.

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Ning does not disclose the metal layer comprises small amounts of Si, Mn, and/or Mg.

With respect to claims 73-74, 80-81, and 89-90 Boutin teaches an aluminum alloy for use in the production of the articles subjected to elevated temperature comprises 1.0-1.5% Si, less than 0.2% of Mg and 0.9-1.5% of Mn, Ni or more than 0.005% and Ni+ Fe+ Co is 0.8-2% (Abstract).

Boutin also teaches that the aluminum alloys has improved mechanical characteristics during and after the aluminum alloys exposure to elevated temperature (col. 1, lines 1-25).

Therefore, it would have been obvious to one of ordinary skill in the art to use the aluminum alloy as taught by Boutin in Ning's aluminum layer in order to have improved the mechanical characteristics during and after the aluminum layer exposure to elevated temperature when the power module has large amount of heat build up during the operation process.

Since Ning and Boutin disclose the module comprises the same metal alloy layer as claimed, the same metal alloy layer would have the same properties as claimed such as having the Vicker's hardness of not less than 25 and not more than 40.

Regarding claims 75, 82, 91, it would have been within the purview of one of ordinary skill in the art to have recognized that the aluminum layer could be joined to the ceramic substrate by any conventional process including direct bonding or brazing with a reasonable expectation of success. Absent a teaching of the criticality or showing of

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unexpected results due to the use of brazing as claimed, it would not provide a patentable distinction over the prior art.

Regarding claim 92, Boutin teaches the Mg content is less than 0.2%; however, the claim limitation recites the Mg content is not less than 0.2%. Absent a showing of how the insulating substrate would exhibit a material difference between the metal alloy containing less than 0.2% compared to the alloy containing not less than 0.2%, it would not provide a patentable distinction over the prior art. Specific claimed alloy, whose compositions are in such close proportions to those in the prior art that, prima facie one skilled in the art would have expected them to have the same properties, must be considered to have been obvious from known alloys, *Titanium Metals Corporation of America V. Banner*, 227 USPQ 773.

Regarding claims 99-101, 106-108, 115-118 although Ning discloses that the aluminum ceramic composite is suitable for use in power modules (col. 1, ln. 20-30), it is silent to the structure of the power module such as is claimed. However, the claimed power module structure including a metal base plate and semiconductor tip bonded to the metal alloy layers of the aluminum ceramic composite is a conventional structure. It would have been within the purview of one of ordinary skill in the art to have used the aluminum ceramic composite of Ning in view of Boutin in any conventional power module structure with a reasonable expectation of success.

### ***Response to Arguments***

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Applicant's arguments filed 6-12-06 have been fully considered but they are not persuasive.

Applicant argues that since claims 73-124 are new, they were not treated in the rejection in the prior Office Action. Applicant asserts that the cited references, alone or in combination, neither teach nor suggest the metal alloy layers consisting of the claimed aluminum alloys and having a Vickers hardness in the claimed range.

However, for the reasons set forth in the rejections above, the prior art is viewed to read on the claim limitations for claims 73-75, 80-82, 89-92, 99-101, 106-108 and 115-118.

***Allowable Subject Matter***

Claims 76-79, 83-88, 93-98, 102-105, 109-114 and 119-124 are allowed.

The following is a statement of reasons for the indication of allowable subject matter:

The prior art teaches insulating substrate boards and power modules comprising a ceramic substrate and an aluminum alloy layer formed on the surface thereof by direct bonding or brazing. The prior art further teaches various aluminum alloys having desirable properties. However, the prior art does not teach or suggest the claimed aluminum alloys or that the Vickers hardness of the claimed metal alloy layers is not less than 25 and not more than 35.

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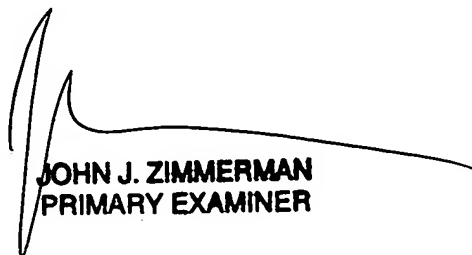
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason L. Savage whose telephone number is 571-272-1542. The examiner can normally be reached on M-F 6:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer McNeil can be reached on 571-272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Jason Savage  
8-18-06



JOHN J. ZIMMERMAN  
PRIMARY EXAMINER